

Name _____

Find Probability

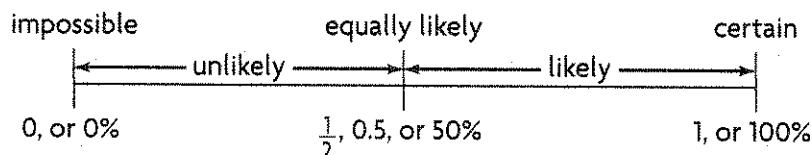
Essential Question How does knowing the number of favorable outcomes of an event help you find the theoretical probability?

DAP.17.5.1 Identify and predict the probability of events within a simple experiment

UNLOCK the Problem REAL WORLD

Dennis plays a game with a number cube labeled 1 to 6. He wins the game if he rolls a number greater than 1. What is the probability that Dennis wins the game?

The **probability** of an event is a measure of the likelihood that the event will occur. This measure ranges from 0, or impossible, to 1, or certain. As shown below, the closer the probability is to 1, the more likely the event is to occur. The closer the probability is to 0, the more unlikely the event is to occur.



The **theoretical probability** of an event is a comparison of the number of favorable outcomes to the number of possible, equally likely outcomes. You can write theoretical probability as a fraction.

$$\text{Probability of an event} = \frac{\text{number of favorable outcomes}}{\text{number of possible, equally likely outcomes}}$$



Find the probability.

STEP 1 List and count the favorable outcomes.

Hint: Favorable outcomes are those that you want to happen.

5 favorable outcomes: 2, 3, 4, _____, _____

STEP 2 Count the possible outcomes.

_____ possible outcomes: _____ numbers on the number cube

STEP 3 Write the probability as a fraction.

$$\text{Probability of a win} = \frac{5 \text{ favorable outcomes}}{\text{possible outcomes}} = \frac{5}{6}$$

So, the probability that Dennis wins the game is _____.



ERROR Alert

Be sure to write the number of favorable outcomes in the numerator and the total number of possible outcomes in the denominator.

Math Talk

Explain how you can use the fraction to describe the likelihood that Dennis will win the game.



Example

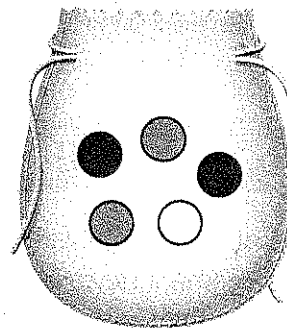
Find the probability of the event of pulling the marble described from the bag without looking. Write the answer as a fraction, a decimal, and a percent.

A white

1 favorable outcome: _____

_____ possible outcomes: 5 marbles in the bag

Probability of white = $\frac{1 \text{ favorable outcome}}{\text{possible outcomes}} = \frac{1}{5}$, 0.20, or _____%



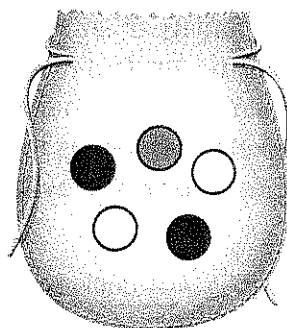
B black or gray

_____ favorable outcomes: _____

5 possible outcomes: _____

Probability of black or gray = _____, _____, or _____%

Think: _____ can be written as a fraction with a denominator of 100.



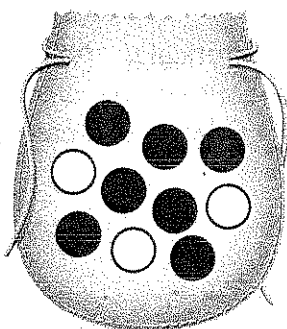
C not black

_____ favorable outcomes: _____

_____ possible outcomes: _____

Probability of not black = _____, _____, or _____%

Think: If a marble in this bag is not black, then it is white.



Try This! Mrs. Miller is conducting an experiment with a coin. She will toss the coin one time. Find the sum of the probabilities of all the outcomes in the sample space.

STEP 1 List the possible outcomes. _____, _____

STEP 2 Write the probability of each outcome as a fraction.

Probability of heads: $\frac{1 \text{ favorable outcome (heads)}}{2 \text{ possible outcomes}} = \frac{1}{2}$

Probability of tails: $\frac{1 \text{ favorable outcome (tails)}}{2 \text{ possible outcomes}} = \frac{1}{2}$

STEP 3 Find the sum of the probabilities. _____ + _____ = _____

So, the sum of the probabilities is _____.

Remember

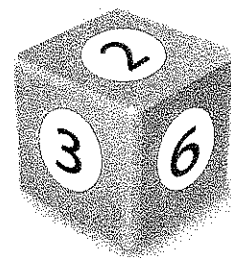
The sample space is the set of all possible outcomes for an experiment.

Name _____

Share and Show

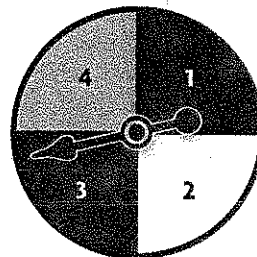


1. A number cube is labeled 1 to 6. What is the probability of rolling an even number? Write the answer as a fraction.



Probability of an even number = $\frac{\text{favorable outcomes}}{\text{possible outcomes}} = \frac{\quad}{6} = \underline{\hspace{2cm}}$

Use the spinner to find the probability of spinning the event. Write the answer as a fraction, a decimal, and a percent.



2. an odd number

3. gray or black

4. a number greater than 3

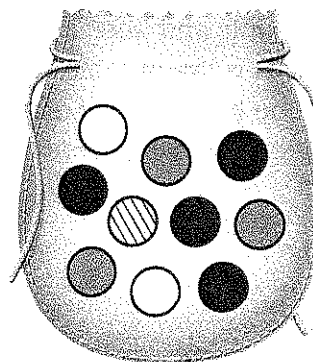
5. *not* white

Math Talk

Explain how you found the number of favorable outcomes in Exercise 5.

On Your Own

Find the probability of the event of pulling the marble described from the bag without looking. Write the answer as a fraction, a decimal, and a percent.



6. gray

7. black or striped

8. *not* gray

9. purple

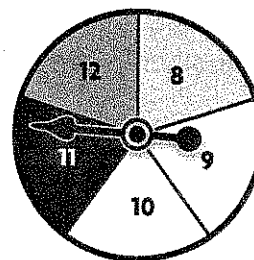
10. black, gray, or white

11. *not* orange

Problem Solving



Use the spinner for 12–13 and 17. Write the answer as a fraction, a decimal, and a percent.



12. What is the probability of spinning a prime number?

13. What is the probability of spinning a number greater than 7?

14. Of 100 tickets for the school raffle, John bought 3, Gary bought 5, and Luis bought 2. What is the probability of each boy winning the raffle? Write each answer as a fraction.

15. **Write Math** What's the Question? Jen has a number cube labeled 1 to 6. The answer is 1.

16. **NOTE** Anna has a bag with 8 cubes, all the same size: 4 blue, 2 yellow, and 2 red. She pulls one red cube from the bag, without looking, and does not put it back in the bag. What is the probability that she pulls a blue cube from the bag after the red cube has been removed? Explain.

17. **★ Test Prep** What is the probability of spinning black or white using the spinner above?

- (A) $\frac{1}{5}$ (C) $\frac{3}{5}$
(B) $\frac{2}{5}$ (D) $\frac{5}{3}$

SHOW YOUR WORK

Name _____

Probability Experiments

Essential Question What is the difference between theoretical probability and experimental probability?

DAP.17.5.1 Identify and predict the *probability* of events within a simple experiment

Investigate

Materials ■ 1 coin

Tossing a coin is an example of a probability experiment. For each toss, the probability of tossing heads is equal to the probability of tossing tails.

- A.** Predict the number of heads and the number of tails if you toss a coin 10 times.

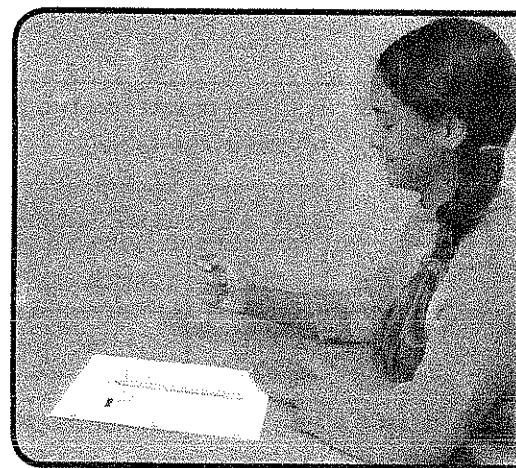
heads: _____ tails: _____

- B.** Toss or drop a coin 10 times. Record the actual results in the tally table.

- C.** Do the experiment 2 more times. Toss the coin 10 times in each experiment and record the results in the tally table.

- How do the outcomes of the three experiments compare with each other and with your original prediction?

Coin Experiment			
	1	2	3
Heads			
Tails			



Draw Conclusions

- 1.** Explain what you think will happen if you toss 3 heads in a row. Do you think the next toss is more likely to be tails?

- 2.** Evaluate If you could toss the coin thousands of times, about how many times do you think you would toss tails? Explain.

Make Connections

The **experimental probability** of an event is a comparison of the number of times an event occurs to the total number of trials, or times the activity is performed.

$$\text{experimental probability} = \frac{\text{number of times an event occurs}}{\text{total number of trials}}$$

You can find and compare experimental and theoretical probabilities.

Materials ■ 8-section spinner

STEP 1 Color each section of the spinner using one of these colors: black, white, striped, and gray. Use each color twice.

STEP 2 Predict the probability that you will spin white on your first spin by finding the theoretical probability of spinning white. Write the answer as a fraction in simplest form.

$$\frac{\text{white}}{8} = \frac{\text{ }}{\text{ }}$$

STEP 3 Spin the pointer on the spinner 10 times and record the results in the table.

Spinner Experiment				
Color	black	white	striped	gray
Tally				

STEP 4 Find the experimental probability of spinning white. Write the answer as a fraction in simplest form.

number of times red occurs: _____

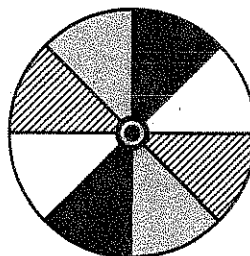
total number of trials: _____

experimental probability = $\frac{\text{ }}{\text{ }}$

- Is the experimental probability of spinning white close to the theoretical probability of spinning white? Explain.

Remember

The theoretical probability of an event is a comparison of the number of favorable outcomes to the number of possible, equally likely outcomes.



Math Talk

Based on your experimental results, would you describe the likelihood of spinning gray as *certain*, *impossible*, *likely*, *unlikely*, or *equally likely*?

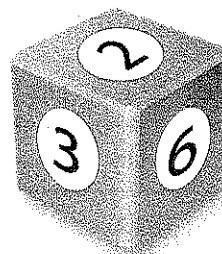
Name _____

Share and Show



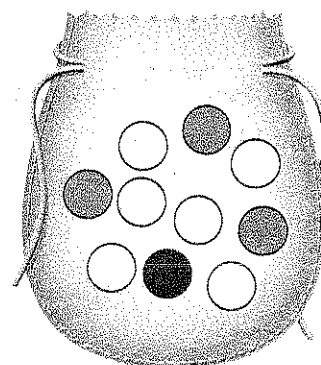
1. Roll a number cube labeled 1 to 6 twenty times, and record the results in the tally table. Then find the experimental probability of rolling 4 and write the answer as a fraction in simplest form.

Number Cube Experiment						
Outcome	1	2	3	4	5	6
Tally						



20

Gina pulled a marble, without looking, from the bag at the right. She recorded its color and put the marble back in the bag. She did this 40 times and recorded the results in the table below. For 2–5, use the table to find the experimental probability of Gina pulling a marble of each color from the bag. Write the answer as a fraction in simplest form.



Gina's Marble Experiment			
Color	Gray	White	Black
Number of Times Pulled	8	28	4

2. Gray

3. White

4. Black

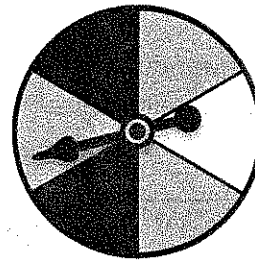
5. **Write Math** Explain how the theoretical probability of pulling a white marble from the bag compares with the experimental probability of pulling a white marble from the bag.

Math Talk Will every possible number occur when a number cube is rolled 20 times? Explain.

Problem Solving

What's the Error?

6. Carl conducted a probability experiment with the spinner at the right. He spun the pointer 30 times and recorded the results in the table below. Then he found the experimental probability of spinning black and wrote the answer as a fraction in simplest form.



Carl's Spinner Experiment	
Color	Tally
White	4
Gray	14
Black	12

Look how Carl solved the problem.
Find his error.

number of times black occurs: 2
number of trials: 30
experimental probability of
spinning black = $\frac{2}{30}$, or $\frac{1}{15}$

Solve the problem and correct the error.

number of times black occurs: 12
number of trials: 30
experimental probability of
spinning black = $\frac{12}{30}$, or $\frac{2}{5}$

- Describe Carl's error.

- What if Carl repeats the experiment and the pointer lands on black 10 times? How does the experimental probability of spinning black change?

Name _____

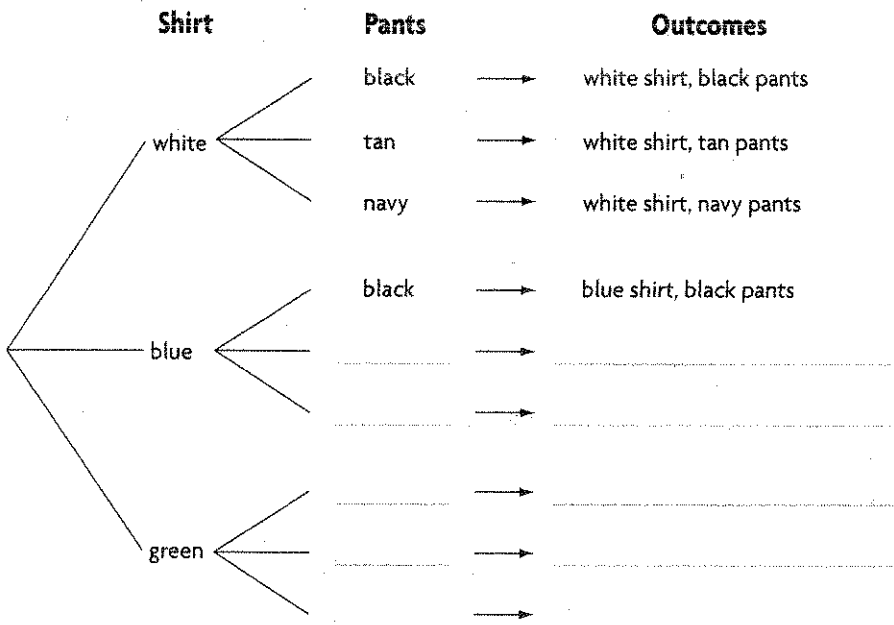
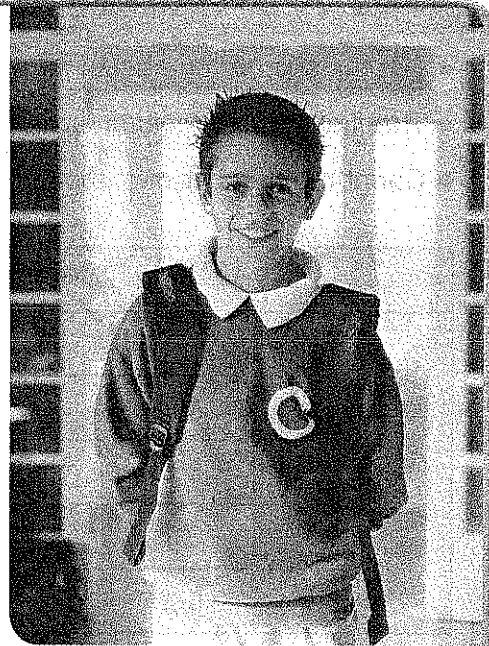
Represent Outcomes**Essential Question** How can you represent the possible outcomes for a given situation?**DAP.17.5.2** List and explain all possible outcomes in a given situation**UNLOCK the Problem** REAL WORLD

Jeff wears a school uniform. He can wear a white, blue, or green shirt, and he can choose black, tan, or navy pants. How many different uniform choices does Jeff have?

One Way Draw a tree diagram.

A **tree diagram** is a specific kind of organized list that shows all possible choices or outcomes. A tree diagram uses branches to connect the choices from groups of objects or of an event.

- List the shirt choices in a column.
- List the pants choices in a column next to each shirt color.
- Connect the choices with branches.
- Read the choices from left to right and list them.

**Math Idea**

You can use a tree diagram to list all of the possible outcomes and to find the number of possible outcomes.

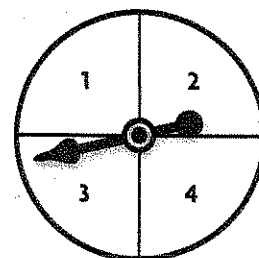
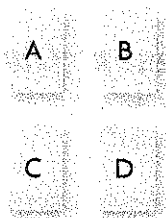
So, Jeff has _____ different uniform choices.



Another Way Make a chart to find the number of possible outcomes.

Sara is conducting an experiment with the cards and spinner at the right. Find the number of possible outcomes if Sara selects one card, without looking, and spins the pointer on the spinner.

- List the spinner numbers in a row and the card letters in a column.
- The first row and column are complete. Complete the rest of the chart.
- Count the number of outcomes.



A, 1 refers to card A and the section of the spinner labeled with a 1.

		Spinner			
Card		1	2	3	4
	A	A, 1	A, 2	A, 3	A, 4
	B	B, 1	_____	_____	_____
	C	C, 1	_____	_____	_____
	D	D, 1	_____	_____	_____

So, there are _____ possible outcomes for Sara's experiment.

Try This! Use another method to find the number of possible outcomes for Sara's experiment.

You can multiply to find the number of possible outcomes using the **Multiplication Principle of Counting**. If one event has m possible outcomes, and another event has n possible outcomes, there are $m \times n$ total possible outcomes for the two events together.

4 letters

4 numbers

total number of
outcomes

_____ \times _____ = _____

So, there are _____ possible outcomes for Sara's experiment.

- What if there were 5 sections on the spinner? How would the number of possible outcomes change? Explain your answer.

Math Talk

Explain how you would use the Multiplication Principle of Counting to find the number of uniform choices that Jeff has in the problem on page TG77.

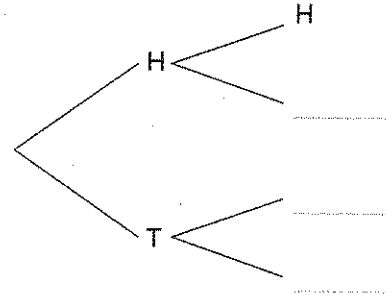
Name _____

Share and Show



1. Complete the tree diagram at the right to find the number of possible outcomes when tossing two coins.

_____ outcomes



Draw a tree diagram or make a chart to find the number of possible outcomes for the situation.

2. Rhea can wear a black, blue, or red shirt, with white or tan shorts.

_____ outcomes

Math Talk

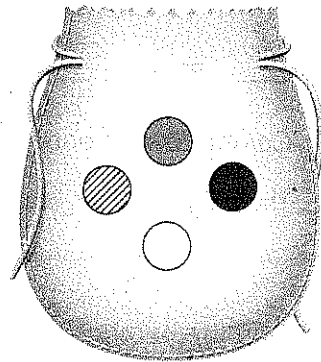
Explain how you would use the Multiplication Principle of Counting to find the number of possible outcomes in Exercise 2.

On Your Own

Draw a tree diagram or make a chart to find the number of possible outcomes for the situation.

3. Dylan tosses a coin once, and pulls one marble, without looking, from the bag at the right.

_____ outcomes



Use the Multiplication Principle of Counting to find the number of possible outcomes for the situation.

4. Pedro uses 2 spinners, each with 5 equal sections labeled 1, 3, 5, 7, and 9.

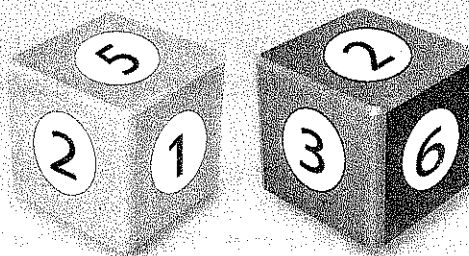
_____ outcomes

5. Nicole chooses a pizza from 4 pizza crusts and 8 toppings.

_____ outcomes

UNLOCK the Problem REAL WORLD

6. Chandra is playing a game that uses two number cubes, each labeled 1 to 6. She rolls both number cubes and adds the numbers. If the sum is equal to 10, she wins a prize. List the possible outcomes and name the ways Chandra can win a prize.



- a. What do you need to find?

- b. Complete the chart below to list the possible outcomes.

		Second Number Cube					
		1	2	3	4	5	6
First Number Cube	1	1, 1	1, 2	1, 3	1, 4	1, 5	1, 6
	2	2, 1	2, 2	2, 3	_____	_____	_____
	3	3, 1	_____	_____	_____	_____	_____
	4	4, 1	_____	_____	_____	_____	_____
	5	5, 1	_____	_____	_____	_____	_____
	6	6, 1	_____	_____	_____	_____	_____

- c. How can you use the chart to find the ways Chandra can win a prize?

- d. Complete the sentence.

There are _____ ways Chandra can win a prize.

7. Find the number of possible outcomes when tossing a coin and rolling a number cube labeled 1 to 6.

8. ★ Test Prep Sanjay is making greeting cards. He has a choice of 6 cards and 4 envelopes. How many choices does he have?

- (A) 6 choices (C) 20 choices
 (B) 10 choices (D) 24 choices

Name _____

Mean, Median, Mode, and Range

Essential Question How can the mean, median, mode, and range help you describe data?

DAP.15.5.2 Determine, with and without appropriate *technology*, the *range*, *mean*, *median* and *mode* (whole number data sets) and explain what each indicates about the set of data

UNLOCK the Problem REAL WORLD

Darius is collecting donations for a school fundraiser. He records the amount each person donates in a graph. What is the mean amount donated?

The **mean** is the average of a set of numbers.

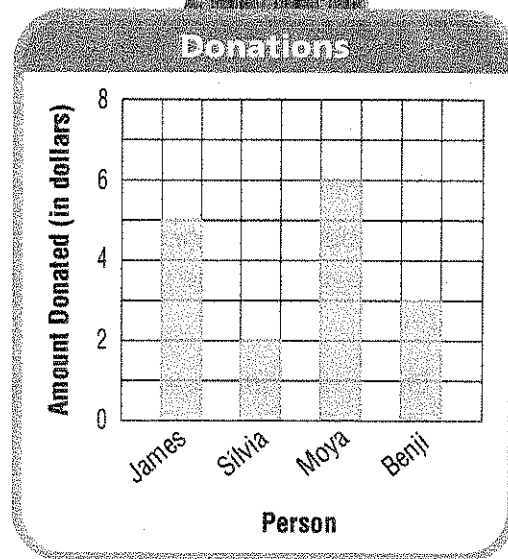
One Way Use a graph.

STEP 1 Look at the data in the graph. Each square represents \$1 donated.

STEP 2 To find the mean, make the bars equal. Cross out squares from the taller bars and move them to the shorter bars until all of the bars have the same height.

STEP 3 The mean is the amount shown by each of the bars with the same height.

So, the mean amount donated is _____.



Another Way Use pencil and paper.

The mean can be calculated by finding the sum of the data and dividing by the number of addends.

5, 2, 6, 3

STEP 1 Find the sum of the data.

$$\underline{\quad} + \underline{\quad} + \underline{\quad} + \underline{\quad} = \underline{\quad}$$

STEP 2 Divide the sum by the number of addends.

$$\underline{\quad} \div \underline{\quad} = \underline{\quad}$$

So, the mean of the data is _____.

Example

Carolyn records the number of pencils the first nine students bought on the first day of school. Her data is shown in the table at the right. Find the median, mode, and range of the data.

Pencils Sold		
2	8	4
5	1	9
4	3	6

A Find the median.

The **median** is the middle number in a set of data that is arranged in order. When there are two middle numbers, the median is the mean of those two numbers.

STEP 1 Order the data in a list from least to greatest.

STEP 2 Find the middle number. Cross out an equal number of values from the left and from the right until the middle number remains.

Median: _____

B Find the mode.

The **mode** is the number or item that occurs most often in a set of data. There may be one mode, more than one mode, or no mode at all.

STEP 1 Order the data in a list from least to greatest.

STEP 2 Find and circle the number that occurs most often.

Mode: _____

C Find the range.

The **range** is the difference between the greatest number and the least number in a set of data.

STEP 1 Order the data in a list from least to greatest. Circle the greatest and least numbers.

STEP 2 Subtract the least number from the greatest number.

Range: _____

Try This! Find the mean, median, mode, and range.

6, 10, 2, 7, 7, 4

Mean: _____

Mode: _____

Median: _____

Range: _____

Name _____

Share and Show



Find the mean, median, mode, and range for the data.

1. 8, 8, 14, 5, 38, 5

Mean: _____ Divide the sum of the data by the number of addends.

Order the data from least to greatest. _____

Median: _____ Mode: _____ Range: _____

2. \$3, \$11, \$5, \$6, \$15

Mean: _____ Median: _____

Mode: _____ Range: _____

3. 16, 11, 7, 11, 14, 25

Mean: _____ Median: _____

Mode: _____ Range: _____

Math Talk

Explain what the mean, median, mode, and range represent for a set of data.

On Your Own

Find the mean, median, mode, and range for the data.

4. 3, 1, 4, 6, 7, 13, 1

Mean: _____ Median: _____

Mode: _____ Range: _____

5. 36, 47, 44, 40, 42, 43

Mean: _____ Median: _____

Mode: _____ Range: _____

Practice: Copy and Solve Find the mean, median, mode, and range for the data.

6. \$6, \$6, \$8, \$12

7. 9, 6, 5, 9, 11

8. 33, 36, 35, 37, 39

9. 32, 25, 28, 19

10. 18, 15, 17, 18, 5, 17

11. 285, 213, 285, 202, 315

Problem Solving

REAL WORLD

Use the table for 12–15.

12. Find the mean, median, mode, and range of the average daily temperatures during one week in Mytown, USA.

Average Daily Temperature (°F) in Mytown, U.S.A.						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
81°	78°	74°	73°	74°	75°	77°

Mean: _____ Median: _____

Mode: _____ Range: _____

13. **Write Math** Which measure (mean, median, mode, or range) could you use to best describe the average daily temperature in Mytown, USA? Explain your answer.

14. **NOT** Jackie scored 87, 78, 97, and 94 on 4 tests. She says a score of 89 on the fifth test will give her a mean test score of 92. Does Jackie's statement make sense? Explain why or why not.

15. **★ Test Prep** What is the median for the set of data?

45, 28, 17, 33, 41, 51, 17, 40

- (A) 17 (C) 36
(B) 34 (D) 36.5

SHOW YOUR WORK

Name _____

AR.2.2

Analyze Double-Bar Graphs

Essential Question What questions can you answer using a double-bar graph?

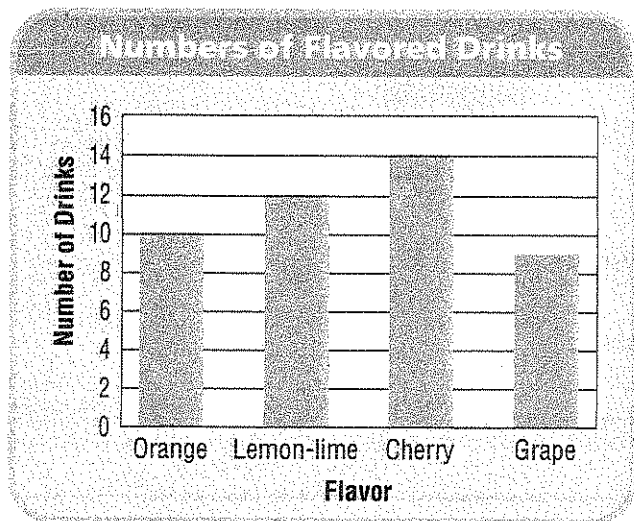
DAP.14.5.3 Construct and interpret *frequency tables, charts, line plots, stem-and-leaf plots and bar graphs*

DAP.15.5.1 Interpret graphs such as *line graphs, double bar graphs, and circle graphs*

UNLOCK the Problem REAL WORLD

Charlie is stocking the concession stand for the first game of the youth baseball season. The flavored drinks that are already in the cooler are organized by flavor. How many more cherry drinks are there than orange drinks?

- Underline the sentence that tells you what you are trying to find.
- Draw a circle around the bars that represent the flavors of drink you will analyze to solve the problem.



ERROR Alert

Be sure to consider the interval on the scale when you find the difference between the heights of two bars in a graph.



Use the bar graph.

STEP 1 Locate the bar for the cherry drinks.

STEP 2 Locate the bar for the orange drinks.

STEP 2 Using the scale, find the difference between the numbers reached by the bars for cherry and orange drinks.

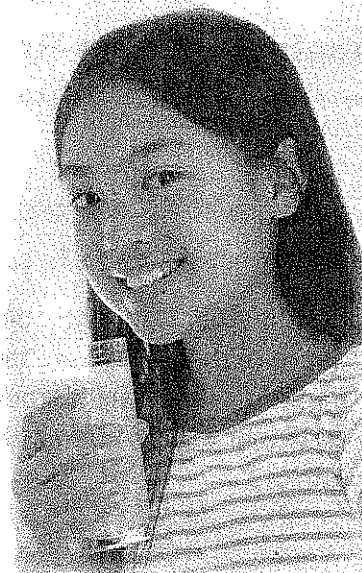
There are _____ cherry drinks.

There are _____ orange drinks.

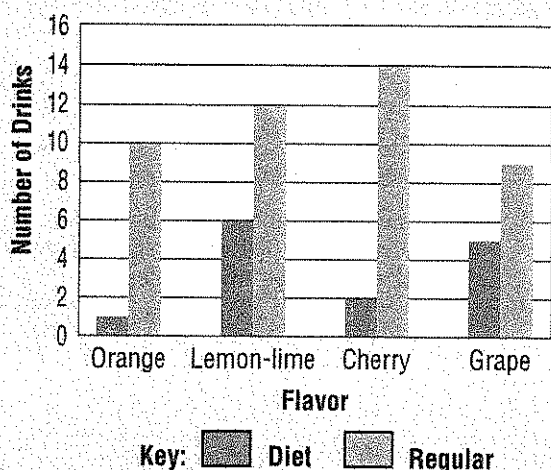
So, there are _____ more cherry drinks than there are orange drinks.



Example For which flavored drink are there exactly twice as many regular drinks as there are diet drinks?



Numbers of Flavored Drinks



Math Talk

Explain why you would visually compare the related bars in a bar graph before you analyze the data.

- Look at the bars on the graph.
- Find the pair of bars in which the bar for the regular drink looks twice as tall as the bar for the diet drink. To check, compare the numbers for the heights of the bars.

So, there are twice as many regular _____ drinks as there are diet drinks.

- What if a graph has intervals that are too large? Explain how your ability to accurately read the graph could be affected by the intervals being too large.

Try This! Use the double-bar graph to answer the questions.

- A** For which flavor is there the greatest difference between the numbers of diet and regular drinks? For which flavor is there the least difference?

greatest difference: _____

least difference: _____

- B** How many more regular orange-flavored drinks are there than diet?

Name _____

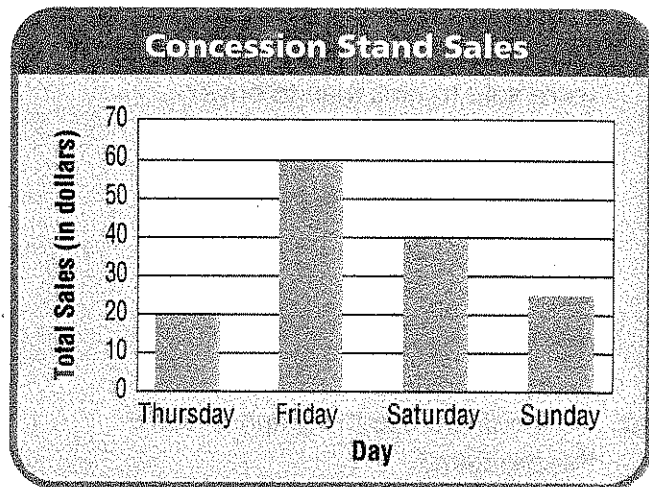
Share and Show



Use the bar graph at the right for 1–3.

1. On which day were the greatest total sales recorded?

Think: The greatest total sales would have the tallest bar.



2. How much greater were the total sales on Saturday than on Thursday?

3. On which days were the total sales less than \$30?

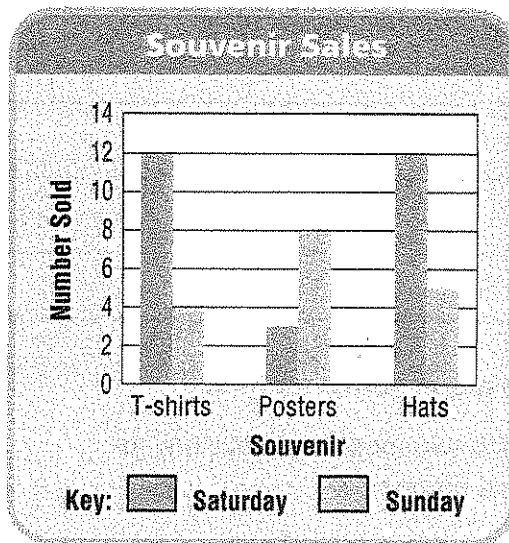
On Your Own

Use the double-bar graph at the right for 4–6.

4. How many more posters were sold on Sunday than were sold on Saturday?

5. For which souvenir were there 3 times as many items sold on Saturday as on Sunday?

6. **HOT** For which souvenir was the greatest number sold the entire weekend? Explain your answer.

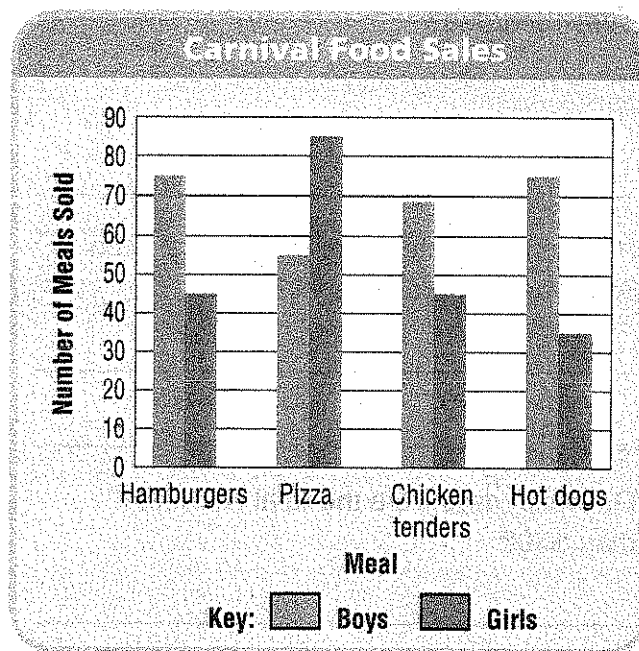


7. Samira recorded the meals sold at the school carnival. How many more pizzas were sold to girls than to boys?

(A) 20
(B) 30
(C) 55
(D) 85

- a. How will you use the graph to solve the problem?

- b. What does the key identify?



- c. Using the key, complete the sentences.

_____ girls bought pizza.

_____ boys bought pizza.

- d. Fill in the bubble for the correct answer choice above.

Use the graph above for 8–9.

8. Which two meals did boys buy in equal numbers?

(A) hamburgers and pizza
(B) pizza and chicken tenders
(C) hamburgers and hot dogs
(D) chicken tenders and hot dogs

9. How many more pizzas than hot dogs did girls buy?

(A) 35
(B) 40
(C) 50
(D) 85

Name _____

Stem-and-Leaf Plots and Histograms

Essential Question How can you use stem-and-leaf plots and histograms to organize data?

A **stem-and-leaf plot** uses place value to organize data. A stem-and-leaf plot is useful when you need to see each item in a data set and the distribution of the data.

DAP.14.5.2 Collect *numerical* and *categorical* data using surveys, observations and experiments that would result in *bar graphs*, *line graphs*, *line plots* and *stem-and-leaf plots*

DAP.14.5.3 Construct and interpret *frequency tables*, *charts*, *line plots* *stem-and-leaf plots* and *bar graphs*

UNLOCK the Problem REAL WORLD

The table shows the ages of winners of the Academy Award for Best Actor from 1991 to 2008. What is the median age of the winners?

Ages of Best Actor Winners					
54	52	37	38	32	45
60	46	40	36	47	29
43	37	38	45	50	48

Make a stem-and-leaf plot.

STEP 1

Group the data by the tens digits. Then order the data from least to greatest.

29
32, 36, 37, 37, 38, 38
40, 43, 45, 45, 46, 47, 48

STEP 2

Use the tens digits as stems. Use the ones digits as leaves. Write the leaves in increasing order.

Stem	Leaves
2	9
3	2 6 7 7 8 8
4	0 3 5 5 6 7 8

STEP 3

Add a key that tells what the numbers mean.

5

6

2|9 =

There are 18 data values. The median is the mean of the two middle values. Use the stem-and-leaf plot to find the 9th and 10th values.

$$\frac{+}{2} = \frac{+}{2} =$$

So, the median age of Best Actor winners is _____.



Remember

The median is the middle value when the data are written in order. If the number of data items is even, the median is the mean of the two middle values.

1. Explain how a stem-and-leaf plot makes it easy to make a prediction.

When there is a large number of data values, it is helpful to group the data into intervals. A **histogram** is a bar graph that shows the frequency of data in intervals. Unlike a bar graph, there are no gaps between the bars in a histogram.

Example

The table shows the ages of winners of the Academy Award for Best Actress from 1985 to 2008. How many of the winners were under 40 years old?

Make a histogram.

STEP 1

Make a frequency table using intervals of 10.

Interval	20–29	30–39	40–49	50–59	60–69	70–79	80–89
Frequency	7	10	4	0	2	0	1

STEP 2

Set up the intervals along the _____ axis of the graph.
Write a scale for the frequencies on the _____ axis.

STEP 3

Graph the number of winners in each interval.

STEP 4

Give the graph a title and label the axes.

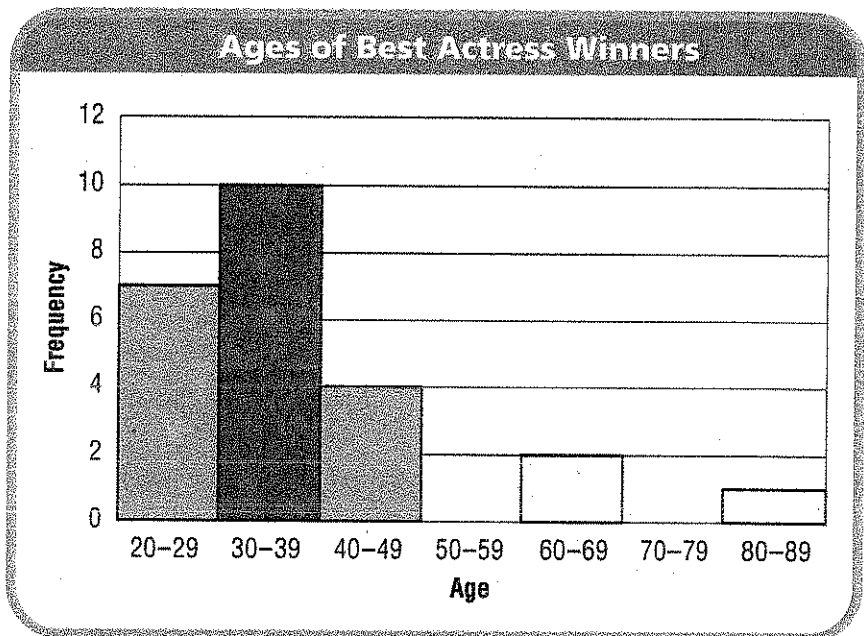
Complete the histogram by drawing the bars for the intervals 60–69, 70–79, and 80–89.

To find the number of winners who were under 40 years old, add the frequencies for the intervals 20–29 and 30–39.

_____ + _____ = _____

So, _____ of the winners were under 40 years old.

Ages of Best Actress Winners					
61	21	41	26	80	42
29	33	36	45	49	39
34	26	25	33	35	35
28	30	29	61	32	33



2. Does the histogram support a prediction that the winner in 2009

was between 50–59 years old? _____

Name _____

Share and Show



For 1–4, use the data at right.

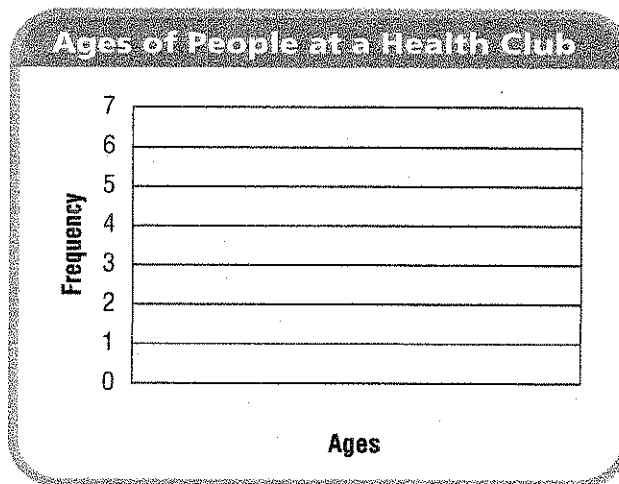
Ages of People at a Health Club (yr)				
21	25	46	19	33
38	18	22	30	29
26	34	48	22	31

- Complete the stem-and-leaf plot.

Stem	Leaves
1	8 9
2	1 2 2 5 6 9
3	
4	

1|8 = 18

- Use your stem-and-leaf plot to find the median of the data.



- Complete the histogram for the data.
- Use your histogram to find the number of people at the health club who are 30 or older.

Math Talk

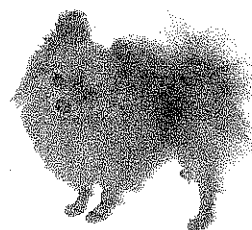
Explain how to use the histogram to predict the age of the next person to join the health club.

On Your Own

Copy and solve. For 5–9, use the table.

Weights of Dogs (lb)				
16	20	15	24	32
33	26	30	15	21
21	12	19	21	37
10	39	21	17	35

- Make a stem-and-leaf plot of the data.
- Use your stem-and-leaf plot to find the median and mode of the data.
- Make a histogram of the data using the intervals 10–19, 20–29, and 30–39.
- Make a histogram of the data using the intervals 10–14, 15–19, 20–24, 25–29, 30–34, and 35–39.
- Explain how using different intervals changed the appearance of your histogram.



Problem Solving REAL WORLD

The histogram shows the hourly salaries, to the nearest dollar, of the employees at a small company. Use the histogram to solve 10–13.

10. How many employees make less than \$20 per hour?

11. How many employees work at the company? Explain how you know.

12. **Hot** Pose a Problem Write and solve a new problem that uses the histogram to make a prediction.

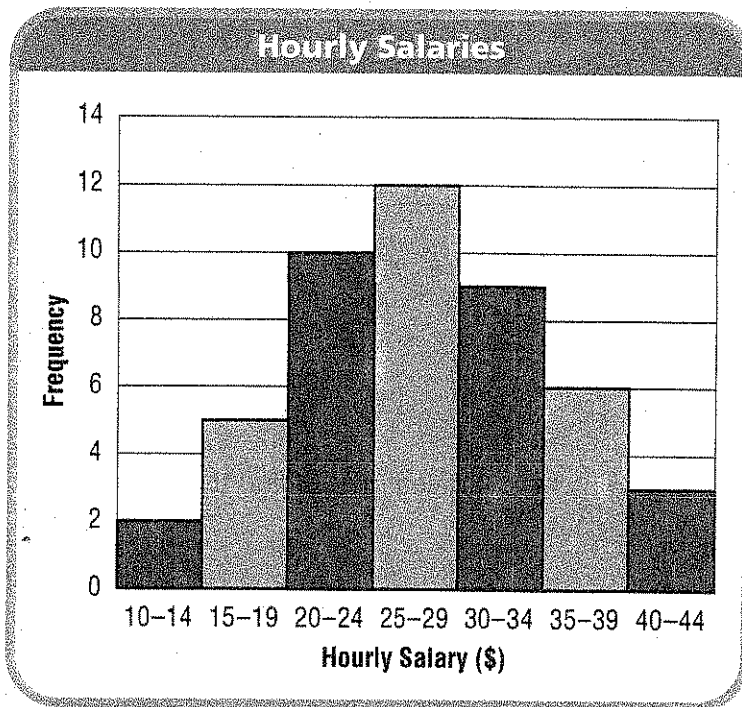
13. **Write Math** Describe the overall shape of the histogram. What does this tell you about the salaries at the company?

14. **★ Test Prep** The stem-and-leaf plot shows the height, in inches, of some basketball players. What fraction of the players are less than 70 inches tall?

Stem	Leaves
6	9 9
7	0 1 3 6 7 7 7 9
8	0 1

6|9 = 69

- (A)** $\frac{1}{12}$ **(C)** $\frac{1}{5}$
(B) $\frac{1}{6}$ **(D)** $\frac{1}{2}$



Name _____

Analyze Circle Graphs**Essential Question** What questions can you answer using circle graphs?**DAP.15.5.1** Interpret graphs such as *line graphs, double bar graphs, and circle graphs.*

Presenting categories of data in a **circle graph** allows you to display the relationship between parts and a whole. The sections of a circle graph represent the percentage of data in each category.

UNLOCK the Problem **REAL WORLD**

Sophia is using the results of a survey to organize a bake sale. What percentage of people chose chocolate chip or oatmeal cookies as their favorite baked good?

- What word in the problem tells you that you need to add?

**Find the percentage.**

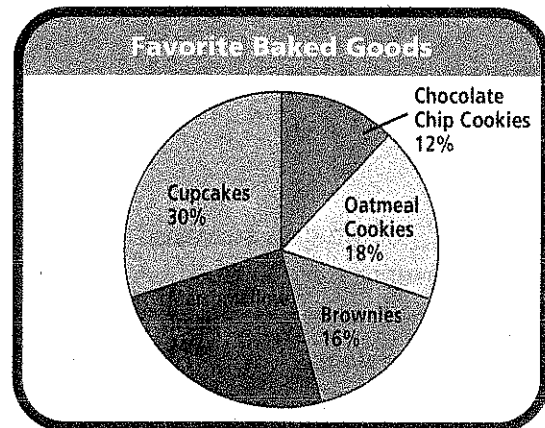
The percentage associated with chocolate chip or oatmeal cookies is the sum of the percentages associated with each type of cookie:

Chocolate chip cookies were chosen by: _____%

Oatmeal cookies were chosen by: _____%

Sum: _____%

So, _____% chose chocolate chip or oatmeal cookies.

**Math Talk**

Why must the sum of the percentages in a circle graph be 100%?

- Explain how to find the number of people that chose oatmeal or chocolate chip cookies if you know the number of people surveyed.

- How can you tell the most selected baked good without looking at the percentage?



Example Find the fraction.

Of the girls surveyed, what fraction chose oatmeal cookies?

STEP 1 Find the section that represents the number of girls who chose oatmeal cookies as their favorite baked good.

_____ girls chose oatmeal cookies.

STEP 2 Find the total number of girls who participated in the survey by adding the number of girls who chose each baked good.

$$30 + 12 + 25 + 43 + 15 = \underline{\hspace{2cm}}$$

STEP 3 Write the part and the whole as a fraction in its simplest form.

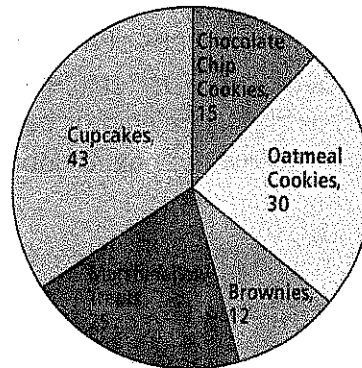
$$\frac{\text{part}}{\text{whole}} = \frac{\boxed{30}}{\boxed{125}} = \frac{\boxed{6}}{\boxed{25}}$$

So, _____ of the girls surveyed chose oatmeal cookies as their favorite baked good.

Math Idea

The sections of a circle graph can display the percentage of the whole or the actual data amount.

Favorite Baked Goods of Girls



2. Explain how the number of girls that chose oatmeal cookies compares to the number of girls that chose chocolate chip cookies.

Try This!

Find the percentage of the girls that chose oatmeal cookies as their favorite baked good. Convert the fraction found in the example to a decimal by division, and then multiply by 100:

Divide:

$$\frac{\boxed{6}}{\boxed{25}} = 0.\underline{\hspace{2cm}}$$

Multiply by 100:

$$0.\underline{\hspace{2cm}} \times 100 = \underline{\hspace{2cm}}\%$$

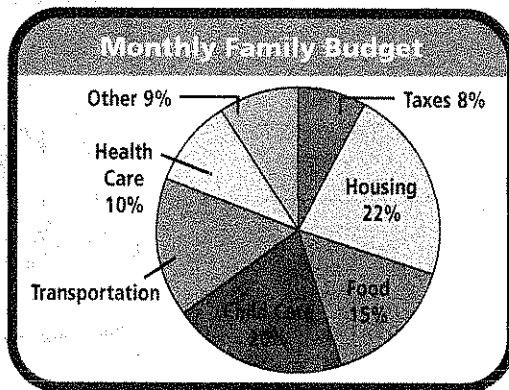
So, _____ of girls chose oatmeal cookies as their favorite baked good.

Name _____

Share and Show



Use the circle graph below for 1–4.



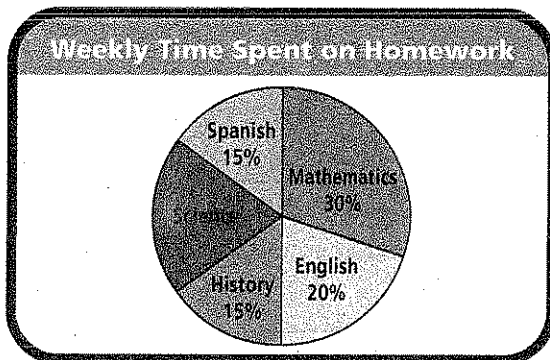
Math Talk

How do circle graphs compare data?

1. Complete the circle graph by determining the percentage spent on transportation. _____
2. What fraction of the family's budget is spent on taxes? _____
3. What percent of the monthly budget was spent on child care or health care? _____
4. If the family's monthly income is \$4,000, how much is spent on child care? _____

On Your Own

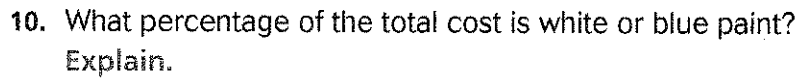
Use the circle graph below for 5–8.



5. Complete the circle graph by determining the percentage of time spent on science homework. _____
6. What fraction of time is spent on history homework? _____
7. What percent of time was spent on mathematics or English homework? _____
8. If 10 hours were spent one week doing homework, how much time was spent on Spanish homework? _____

REAL WORLD

9. What fraction of the total cost is the cost of the paint thinner?
Explain.



11. Evaluate What conclusion can you make about the cost of paint?

12. **NOT** Which 3 items combine to equal $\frac{3}{4}$ of the total cost?
Explain.

13. ★ Test Prep How does the cost of the drop cloth compare with the cost of the white paint?

- (A) It is $\frac{1}{3}$ the price.
 (B) It is $\frac{1}{2}$ the price.
 (C) It is 2 times the price.
 (D) It is 3 times the price.

SHOW YOUR WORK

Name _____

Draw Conclusions

Essential Question How can you draw conclusions and make predictions from bar graphs, line graphs, and pictographs?

A.6.5.1 Draw conclusions and make predictions, with and without appropriate *technology*, from models, tables and *line graphs*

DAP.16.5.1 Make predictions and justify conclusions based on data

UNLOCK the Problem REAL WORLD

A conclusion is a statement based on given data. When you make a conclusion, you look at the facts and tell what you know based on this information.

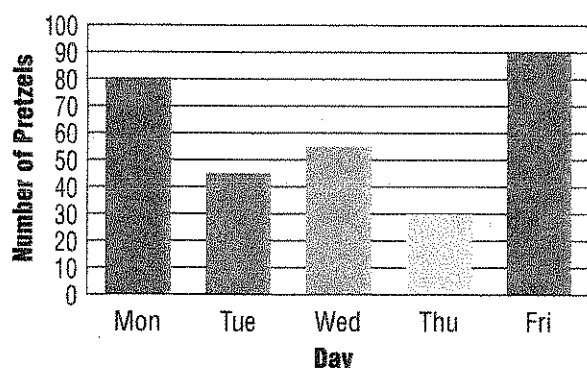
Sometimes you can make a **prediction** based on data. A prediction is a reasonable guess about what may happen, and may end up being true or false.

Example 1 Use a bar graph.

Mrs. Marzipan sold pretzels in a snack bar in a city park. She recorded the number of pretzels sold each day for 5 days.



City Park Pretzels Sold



- For how many days did Mrs. Marzipan record the number of pretzels she sold?

- What is being compared in this bar graph?

A Draw a conclusion.

On which day was the greatest number of pretzels sold?

Conclusion: The greatest number of pretzels was sold on _____.

B Make a prediction.

On which day next week will Mrs. Marzipan sell the most pretzels?

Prediction: Next week, Mrs. Marzipan will sell the most pretzels on _____.



Example 2 Use a line graph.

Camila filled a glass with water. She set the glass outdoors on her patio. Each day for 5 days she measured the height of the water in the glass.

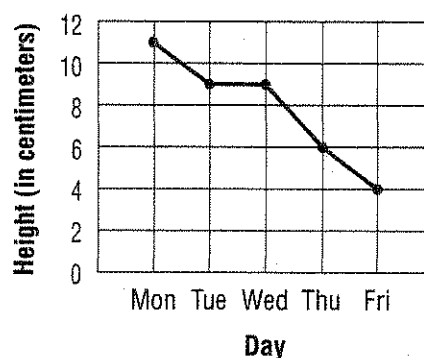
A Draw a conclusion about the height of the water.

Conclusion: The height of the water _____ by about 2 centimeters per day.

B Make a prediction about what the height of the water will be on Saturday. Justify your prediction.

Prediction: On Saturday, the height of the water will be about _____.

Height of Water in a Glass Outdoors



Math Talk

Explain how you know the height of the water will not continue to decrease forever.

Share and Show



Use the graph at the right for 1–2.

- Lori works at a nursery. The graph shows the number of pine trees sold each day last week. The least number was sold on Lori's day off. Draw a conclusion about the day Lori had off. Justify your conclusion.

Conclusion: _____

- Next week, Lori has to work on the day the nursery expects to sell the most pine trees. Make a prediction about which day Lori will work next week. Explain why your prediction is reasonable.

Prediction: _____

Pine Trees Sold

Monday	
Tuesday	
Wednesday	
Thursday	
Friday	

Key: Each = 4 trees.

Math Talk

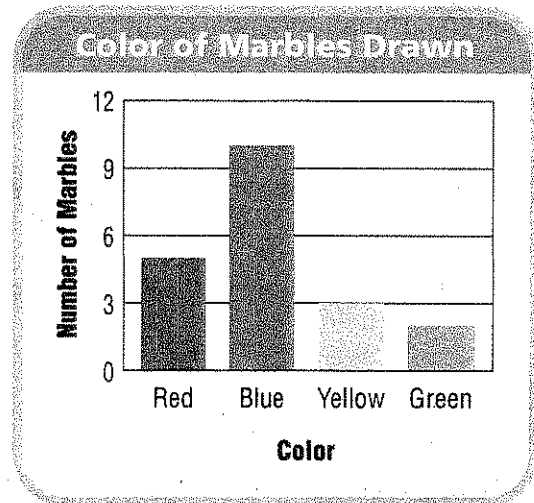
Explain the difference between a conclusion and a prediction.

Name _____

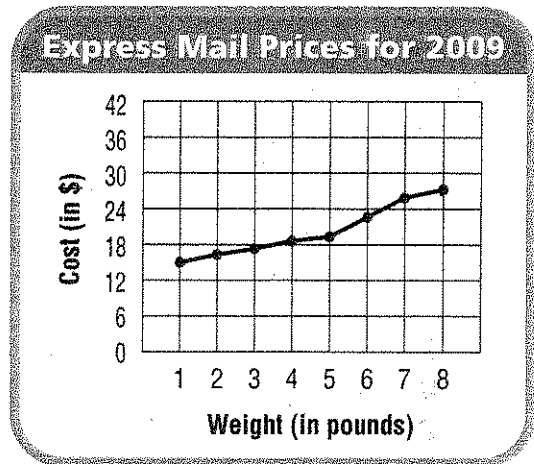
On Your Own

Use the graphs for 3–4.

3. The marbles in a bag are red, blue, yellow, and green. Albert draws 20 marbles from the bag and records the results in the graph. Draw a conclusion about which color most likely outnumbers any other color in the bag. Justify.



4. Melanie wants to send a 10-pound package by express mail. Make a prediction about how much Melanie will spend. Explain your reasoning.



Problem Solving

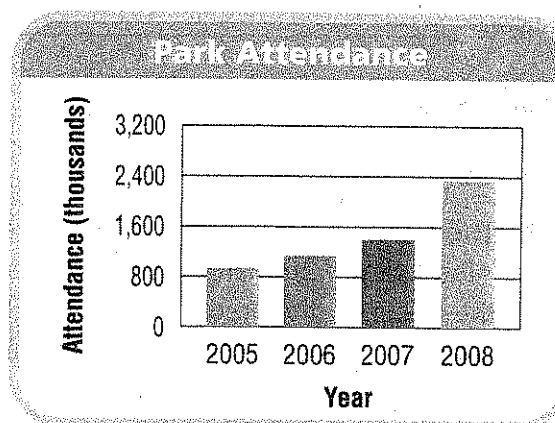


5. **Sense or Nonsense?** Nel looked at the line graph in Problem 4. She predicted that it is free to mail a package weighing less than 1 pound. Is Nel's statement reasonable? Explain.

6. **H.O.T. Write Math** Use the bar graph in Problem 3 to draw a conclusion about the number of red marbles compared to the number of yellow marbles in Albert's bag.

7. ★ Test Prep Which is a reasonable prediction to make about the attendance at the park?

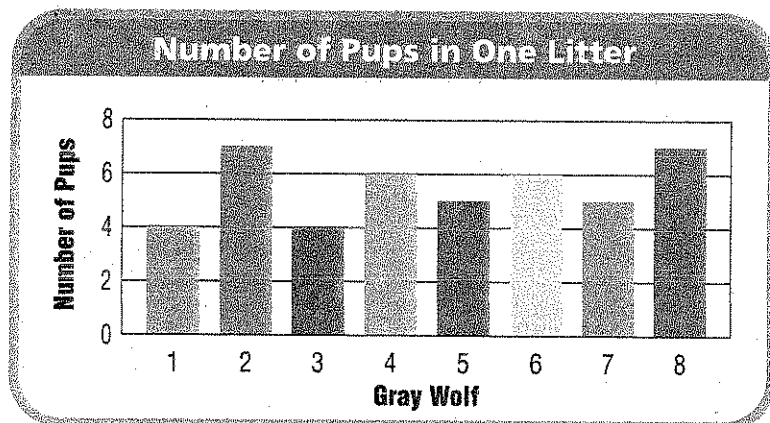
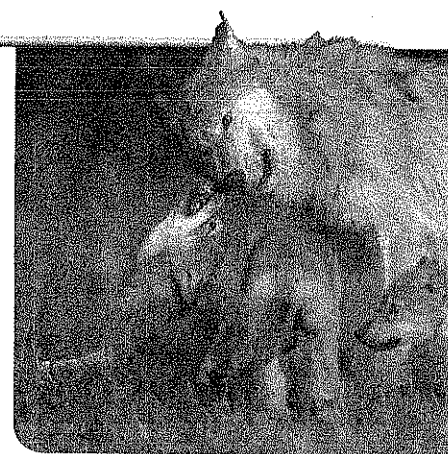
- (A) The attendance in 2009 will be less than in 2005.
- (B) No one visited the park in 1990.
- (C) The attendance in 2009 will be greater than in 2008.
- (D) The attendance in 2015 will be 3,500.



Connect to Science

Gray Wolves

Kelly is a scientist. From hidden observation points, she gathered information about the number of pups born to 8 gray wolves. She recorded and graphed the number of pups.



8. Draw a conclusion about the number of pups born in one litter.
-
9. What if wolves 1 and 3 had each had 2 more pups in their litters? How would your conclusion in Problem 8 change?
-
10. **Algebra** A mother wolf weighs 54 pounds. Her pup weighs x pounds. If the mother weighs 3 times as much as her pup, what is the value of x ? _____